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NOTE.—*The application for a Patent has become void.*

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PATENT SPECIFICATION

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Complete not Accepted.

COMPLETE SPECIFICATION.

Process for Securing Impermeability to more or less Pulverulent Materials.

We, JOSEPH CLAESS, of 461, Chaussée de Boondael, Brussels, Belgium, GUY PIERARD, of 69, Rue Général Leman, Brussels, Belgium, and FERNAND NISOT, of 15, Rue d'Edimbourg, Ixelles-Brussels, Belgium, all three subjects of the King of the Belgians, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to a process for securing impermeability or liquid-tightness to pulverulent materials.

The object of the invention is to protect a more or less pulverulent material of any kind, against the effects or the reaction of a liquid, for instance water, said material being more or less soluble or having affinity for that liquid.

The process according to the invention consists essentially in coating, working under heat or any other conditions, each of the particles of a certain material, completely or partially, with a more or less impalpable and superficial film of a substance considered as insoluble within a determined liquid, and adapted to protect said particles against the effects or reactions of said liquid.

This process differs from the liquid proof materials which are generally added to pulverulent matter when put in use, by the fact that each particle of said material is coated and will regain its original properties by eliminating the protecting substance.

According to the invention, the thin film of protecting substance coating the material will be eliminated, through simple mixing or stirring of the pulverulent material. Said mixing restores to the material its normal chemical properties at the moment of using it, and at the same time, according to the requirements, adds new physical properties to said material insoluble in liquid such as water, alcohol, paraffin, and so on. The treating temperature as well as the proportions of the different insoluble materials depend upon the degree of fineness of the material to be treated and upon the degree of impermeability which is to be obtained.

The coating substance does not essentially transform the qualities and chemical properties of the pulverulent material, but may alter totally or partially its physical properties. Said solid, liquid or fluid substance constitutes, with regard to the liquid, a protecting film for the above-mentioned matter particles. Once used or worked, said particles present impermeability or tightness property distinctly differing from the normal one, with regard to the liquid, or, according to the circumstances, new physical properties susceptible or interesting applications.

The pulverulent materials may be raw, half or completely worked and comprise namely: organic food products, aromatic or sugared alimentary seasonings, grains, starch, flour and so on, or building materials as sand, lime, fire-clay and other earths, gypsum, lime-stone, cements, pouzzolanes, and so on, or solid fuels as coal, liquid fuels, schists, ores, or whatever chemical products, manures, etc.

The coating substances may also be raw, half or completely worked and comprise: animal, vegetable or mineral gums or oils, varnishes, lacs, resins, copal, solid or liquid paraffin as well as its derivatives, palm oil, linseed oil, colza oil, sesame oil, castor-oil, eucalyptus oil, cotton oil, gelatines, glues, enamels, and so on.

The transformation of the treated material by means of the protecting substances may also be effected through mixing, sifting, mashing, stirring or successively through a plurality of said

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operations, separately or in combination. Said transformation may be obtained by mixing under pressure, for instance of compressed air, or by the mixing of a substance having gaseous or pulverulent character, a sifting or whatever stirring being effected before or after said mixing operation.

The impermeability may also be obtained by friction of a portion of the already transformed material with another non transformed portion of said material, or by mixing or insufflation by means of one or a plurality of other elements entering in the manufacture of the material, but to which the substance would be added in whatever proportions, at whatever a stage of the manufacturing. Said result may also be obtained by means of one or more whatever stranger materials which do not enter in the manufacture of the material, but to which the substance would be added and which could be used when using or working the material. According to the transformation that is to be obtained, the proportion of the material to the substance may vary from 0 to 1 unit, by the fact that the material and the substance may respectively be one or a plurality of substances, or a combination of said substances.

To assist the transformation, the material or the substance, or both of them, may be heated; said substance may also be liquefied, gasified, vaporized, with or without heating of said substance or of the material. Said material may also be dried for expelling the liquid in suspension before applying the hereabove described processes.

Moreover, the invention will be more widely described by means of the following examples of application of the process.

The process according to the invention may be applied to building materials and namely to hydraulic binding materials, sand, lime, gypsum, cement, pouzzolenes and so on, which, as is known, are existing in the trade or in their initial state in a more or less pulverulent form, and are more or less hydrophile. By the fact, their transportation, handling, storage, etc., need expensive protective packings or suitable care for preventing any interference of weather inclemency.

Moreover, limes and cements may be used and worked up in mortar or concrete, but in such a form are not offering a large impermeability with regard to a liquid such as water.

These inconveniences will be avoided by giving tightness to materials such as cements, limes, pouzzolanes, etc. with regard to water or similar liquid. Said tightness is obtained by coating the particles of said materials with a thin film of a substance insoluble in water, such as paraffin or paraffin substitutes, that will efficiently and practically protect the material against the liquid interferences. By such treatment of the material, the handling under rainy weather and the storage of said material outside do not affect its perfect state of preservation, for the action of water is reduced to a minimum.

This process allows of making mortars, concretes or whatsoever mixture of said materials much more waterproof. Worked up in motors, concretes or under other similar form, the transformed material, such as cement, lime, etc. behaves as normal cement, because of the sand or gravel interference, which totally or partially eliminates the insoluble protecting film, such as linseed oil, resin or substitutes of same, when mixing the materials. Nevertheless, the impermeability of the mortars, concretes or mixtures will be increased without any noticeable diminution of the chemical qualities, hydraulic properties or strength, by the fact that the insoluble products remain scattered in the mixtures or mortars.

The above-mentioned substances having a base of resin, linseed oil, paraffin or substitutes of same, when mixed two and two or in triple combination, allow to obtain more or less tight cements or more or less impermeable mortars and concretes, according to the proportions, the manner and perfectness of the compound, as well as the intensity and the degree of heating.

It is obvious that the tightness of the cement and the impermeability of the mortars, concretes, etc. may be obtained either by means of the use of a different matter, such as sand or gravel transformed according to one of the mentioned processes, prior to its use, or by adding the substance to the gypsum under any form or manner, or by lively transforming the gypsum by means of said substance and mixing for instance said gypsum with the clinker in a cement mill, or with the cement by any convenient process, etc.

The above-mentioned substances having a base of resin, paraffin or linseed oil or substitutes of same, combined two and two or in triple combination, or mixed with the clinker when grinding the latter or after said grinding, allow also a total or partial reduction of the addition of gypsum in the cement manufacture.

With relation to the application of the process to chemical materials and to pulverulent fuel, the methods will be

identical to that described and the results with respect to impermeability over a certain liquid will be similar.

Certain new physical properties have been stated for instance in pulverulent coal which, by the fact of its tightness to water eliminates the considerable drawbacks met in heating by means of pulverized coal. Indeed, this material treated in conformity with the new process, is provided with the new and interesting property of "flowing". The phenomenon can be explained by the fact that the protective substance completely or partially reduces the friction of the particles of the material the one with the other.

It is obvious that following the result to be obtained, the proportion in material and protective substance will vary, may said materials be single or compound.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1.—A process for securing impermeability to pulverulent materials having chemical affinity for a determined liquid, consisting in coating each particle of material with a thin film of a substance insoluble in said liquid, the substance having such character that the film is eliminated by the mere stirring of the treated pulverulent material, whereby said material regains its chemical properties when worked and used, said protecting substance affording new physical properties to said material.

2.—A process for securing impermeability to hydraulic binding materials in pulverulent state, such as cement, lime, pouzzolanes, as claimed in claim 1, consisting in coating under heat each particle with a thin film of a substance insoluble in water.

3.—A process for securing impermeability to hydraulic binding materials in pulverulent state, such as cement, lime, pouzzolanes, as claimed in claims 1 and 2, consisting in coating under heat each particle with a thin film of paraffin, linseed oil, or a mixture of paraffin and linseed oil.

4.—A process of securing impermeability to pulverulent materials, as claimed in claims 1 to 3, consisting in coating each particle with a thin film of a protecting substance insoluble in the liquids in consideration, the temperature of mixing and the proportions of the ingredients being selected with respect to the grade of fineness of the materials and the degree of impermeability required.

5.—A process for securing impermeability to hydraulic binding materials in pulverulent state, such as cement, lime, pouzzolenes as claimed in claims 1 to 4, consisting in coating under heat each particle with a thin film of a substance insoluble in water, said insoluble substance being mixed to the hydraulic binding materials in variable quantities, during the manufacture of said materials.

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